International Journal of Electrical, Computing Engineering and Communication (IJECC)

Vol. 1, Issue. 1, January – 2015 *ISSN (Online): XXXX-XXXX*

The Improved Method for Measuring the Blur Based on Edge Detection

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Abstract: **An improved method of image blur measure is proposed in this paper. The blur measure is related to on edge detection and it is proper method for a variety of image processing applications. This paper proposed a two phase's scheme to measure the blur. In the first phase I find the standard deviation of the edge gradient magnitude and in the second phase find the value of the edge gradient magnitude using a weighted average. The first phase describes the width of the edge, and the second phase is also included to make the blur measure more consistent. The weight value is interrelated to image contrast and it can be directly calculated from the image.**

Key words: **Blur Measure, Edge detection, Contrast Calculation.**

I.INTRODUCTION

In image processing to find the sharpness of edges can be useful for many no of applications. For example it is used to find the shadows in the images, and separate the illumination form the reflectance. To use this method in color images, easily find the out of focus area.

In my proposed paper I use the color images. And find the blurriness of that image. Here sobel mask used for detect the horizontal and vertical edges of the images. And it does not need any kind of user supplied information, like any kind of values and default results. But just need the camera geometry.

In this paper blur calculation of an edge is obtained by two phases. The Phases are standard deviation of the edge gradient and the value of the edge gradient magnitude using a weighted average. The first phase can be helping me to find the edge width and the second phase can be help for make the blur calculation is more consistent. The weighted average is directly calculated from the contrast value of the original image. Here manual inputs are not needed.

More applications of this proposed method is Detection of shadows as well as Removal of shadows, and benchmarking, and its will be used in the image compression algorithms. These are all the various applications of my proposed Method.

Marziliano *et al.* [5] have proposed a "*no reference perceptual blur metric*", this Method define in the spatial domain as the tack of the edges. (We discuss him method in section II.)

Rooms *et al*. [6] have proposed a method for measuring blur using wavelet method. They measure the sharpest edges in the image by computing the Lipschitz exponent for edges as a smoothness measure. The Lipschitz is a smoothness measure for a certain value. It is actually the result of how many times the image can be differentiable at a single point. This measure is suitable for only focus estimation. Here without using spatial domain processing to avoid noise effects. This estimated blur measure for a whole image may not be suitable for any other image processing applications.

My proposed method is discussed in section II. Experimental results are presented in section III, and Conclusion and future enhancement are in section IV.

II.METHODOLOGY

Blur Measure

Here first I apply the sobel mask for find the vertical edges in the image. To use sobel mask we scan the full image. For every pixels corresponding to an edge position, the starting and ending locations of the edges are denote as the local extreme a positions nearest to the edges. The edge width is given by the difference between the ends and start locations, and is find the blur measure for this edge position. At finally, the blur measure for the full image is calculated by averaging the blur values over all edge positions.

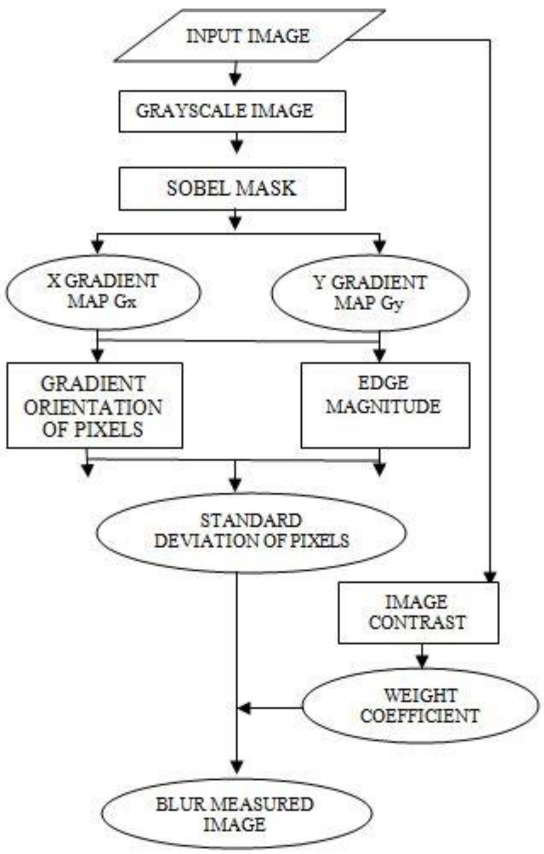


Figure1. Flowchart of calculation of the proposed blur measure

A) PHASE ONE

In color images, blur is measured on the luminance value ***Y.*** This method is used in still images or Digital Images. In digital videos it is not easy to measure the blur. It is straight forward to develop the method by measuring blur in each frame by frame manner.

In this section we will lock at some local operators for finding the edges and consider some of their illumination. Throughout this section, I would define the image as I(x,y). where x and y are the row and column coordinates. In order to identify edges, I find regions of the image where there rapid change in the value of I(x,y),thus I take the differential properties such as the gradient of the image intensity values.

$$\nabla I(x,y) = \frac{G_x}{G_y} = \begin{bmatrix} \frac{\partial}{\partial_x} I(X,Y) \\ \frac{\partial}{\partial_Y} I(X,Y) \end{bmatrix} \quad (1)$$

The gradient magnitude at p can be calculate from Gx and Gy,

$$|G| = \sqrt{G_x^{\ 2} + G_y^{\ 2}} \quad (2)$$

P=(x,y) is consider an edge point and it is defined as a local maximum of the edge gradient magnitude, and the direction of the gradient magnitude is ζ-axis. The point of the local maximum is the origin of the ζ-axis. The edge width w is defined as the difference between the nearest local minimum on the maximum of negative side and positive side.

In My paper, the edge locations are finding out by using the local Maximum points of the gradient magnitude of edges. Here I use atan2 function to find the intervals between the -л to +л. The direction of ζ-axis is defined as α(x,y) = atan2 (Gx ,Gy) and it is denote the direction of the edge point with based on x-axis. The probability distribution is calculated from the edge gradient magnitude between ζ=ml and ζ=mr. Here the mean point ζ = 0. mr denote the positive ζ-axis. And ml denotes the negative ζ-axis.

$$\sigma^2 = \frac{1}{Mr - Ml} \sum_{\zeta = Ml}^{Mr} [\nabla I(\zeta)] \zeta^2 \quad (3)$$

The blur measure for an edge location is calculated by complaining the weighted average value of the standard deviation σ and the edge magnitude values.| $\nabla I(p^1)$|

$$\beta\left(p^1\right)=\eta_\beta \frac{\sigma\left(p^1\right)}{\sigma_{\max}}+\left(1-\eta_\beta\right)\frac{|\nabla I\left(p^1\right)|}{|\nabla I\left(p^i\right)|_{\max}} \quad (4)$$

Here σ max and .$|\nabla I\left(p^1\right)|$max are standard values define the maximum values of the standard deviation and for all edge gradient magnitudes values.

B) PHASE TWO

The value weighted average η_β is directly calculated from the original image. It's related to image contrast and it is given by

$$\eta_\beta = \frac{1}{BC}\sum_{(x,y)}\sum_i \frac{|R_{MSR_i}(x,y)|}{\log_i(x,y)} \quad (5)$$

In this formula B is number of pixels in image. The total no of pixels in image is calculated by multiply row and column of the image. I am using RGB images the value of C=3 else the value of C will be changed. For example I use CMYK color band the value of C=4. In the image I(*x, y*) the value Ii(x,y) is the *ith* color band, here Multi Scale Retinex Algorithm (MSR) is used to find the ith color component. Here the output *RMSRi* is the *ith* color band. The output *RMSRi* is combined weighted sum of *N* Single-scale Retinex (SSR) outputs. The MSR output denotes the value of enhancement needed for edge contrast. The *ith* band of the MSR is calculated by

$$R_{MSR_i} = \frac{1}{N}\sum_N^1\left[\log\left(I_i(x,y)\right)-\log\left(F_n(x,y)*I_i(x,y)\right)\right]$$

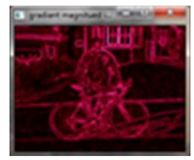
(6)

The symbol * is denote the convolution operation. And Fn(x,y) is the Gaussian smoothing filter and is calculated as $F_n(x,y)=Ke^{\left(x^2+y^2\right)/cn}$. The parameter cn is the scale constant for the nth scale, and K is the constant value. Else directly implement the matrix format of the Gaussian smoothing filter.

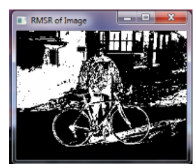
III.EXPERIMENTAL RESULTS

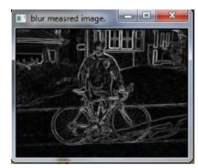
In My proposed method I have use the sobel mask to detect the horizontal and vertical edges of the image. In color images we are not able to use sobel mask. So first convert the color image into grayscale image. The color images are 3D images. In 3D images the sobel mask I didn't implement the sobel mask .only the 2D images only accept the sobel mask.

(a) (b)



(c) (d)





(e) (f)

In this example fig (a) original image (b) horizontal edges (c) vertical edges (d) gradient image (e) MSR image (f) blur measured image

Fig shows an image of my proposed blur measure. Fig (a) is the input image, the (b) and (c) images are the horizontal and vertical edges of the image. The value weighted average η_β is 0.4531. The blur measure for an edge point is calculated by averaging the standard deviation and the edge magnitude. The (d) is the gradient magnitude image, and the (e) is the MSR image. The blur measure is shown in the last image (f). Here sharper edges have higher intensities in the image. Through this method we simply split the blurred image from the sharpest edges,

In my proposed method implemented in many potential applications. First, The removal of intrinsic images from a single image. The blur measures give important details about scene enlightenment because edges of shadows development to be blurred compared to object edges. To compare with the results of previous papers, the removal of basic images can enhanced in our improved blur measure.

More no of applications of the blur calculation could be searched. For example shadow detection as well as the shadow removal and the quality of image compression algorithm., etc.

IV.CONCLUSION

An improved method of image blur measure was proposed in this paper. This paper proposed a two phase's scheme for measure the blur. In the first phase I found the standard deviation of the edge gradient magnitude and the second phase I found the value of the edge gradient magnitude using a weighted average. The first phase describes the width of the edge, and edge gradient magnitude is also integrated to make the blur measure more consistent. Here, the value of the weight is related to image contrast and it can be directly calculated from the image. My proposed method can effectively denote the blurriness of images in image processing applications.

The proposed blur measure was also implemented with some applications including the removal of intrinsic images, and foreground /background differentiation, in addition more no of applications of the blur measure could be searched by the researchers. For example Detection of shadows and Removal of shadows, and some kind of the image compression algorithms., etc.

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